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Dual targeted peptide and folic acid decorated nanoparticles for the delivery of anti-cancer drug to glioma cell

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Effective chemotherapy for glioblastoma requires a smart nanocarrier that can penetrate the blood brain barrier (BBB) and subsequently target the glioma cells. Dual-targeting paclitaxel (Ptx) polymeric nanoparticles (NPs) were produced by conjugating with both folate (FA) and cRGDfK, for the effective penetrating across BBB and targeting glioma, respectively. FA and cRGDfK modified NPs containing paclitaxel was prepared by nanoprecipitation technique. *In vitro* and *in vivo* studies demonstrated that the dual-targeting NPs could transport across the BBB and mainly distributed in the brain glioma. FA and cRGDfk conjugated NPs had maximum entrapment efficiency 81.34±3.41% (n=3). AFM showed NPs to be spherical and nanometric in size. The *in vitro* release followed in a biphasic pattern: i.e. an initial burst release followed by slower and sustained release and resulted in least haemolytic toxicity. The anti-tumor effect of the dual-targeting NPs also demonstrated increased survival time, decreased tumor volume and no significant effect on body weight. The dual-targeted NPs could improve the therapeutic efficacy of brain glioma and were found less toxic than the Ptx solution, showing a dual-targeting effect. These results indicate that dual-targeting NPs is a promising potential carrier for glioma chemotherapy.

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Mucoadhesive biomaterials for targeted drug delivery

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The aim of this study was to develop and evaluate a more effective mucoadhesive thiomer for buccal drug delivery systems. Therefore, 2-iminothiolane was covalently attached to chitosan backbone. Following, a preactivation step followed, mediated by 6,6´dithionicotinamide (6,6-DTNA), thiol groups were modified by disulfide bonds formation. Mucoadhesion studies were performed on mucosa. Additionally, water binding capacity, disintegration and cytotoxicity studies were accomplished. Chitosan-thiobutylamidine-mercaptonicotinamid (Ch-TBA-MNA) displayed 1.8-fold higher stability and 1.6-fold higher mucoadhesive properties, respectively. Due to these results preactivated thiomers exhibits an improved stability and enhanced mucoadhesive properties. Within the present study a preactivated thiolated chitosan matrix for non-invasive drug delivery was developed. The covalent attachment of preactivated thiol groups to thiolated chitosan leads to strongly improved mucoadhesive properties of the thiolated polymer, which is verified by rotating cylinder studies on freshly excised porcine mucosa and by the increase in the total work of adhesion in tensile studies. Because of this slightly chemical modification the swelling behavior of thiolated chitosan could also be improved. This property might be of considerable advantage for applications requiring mucoadhesive and long lasting properties. These features should render preactivated thiolated chitosan as useful therapeutic excipient for various dosage forms providing an improved stability and a prolonged residence time on mucosal tissues. The preactivated thiolated chitosan described within this study raises the bar according to its high mucoadhesive potential as therapeutic agent.

Biography

Flavia Laffleur is pursuing her PhD from University of Innsbruck at the Department of pharmaceutical technology. She has published two papers in reputed journals.

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